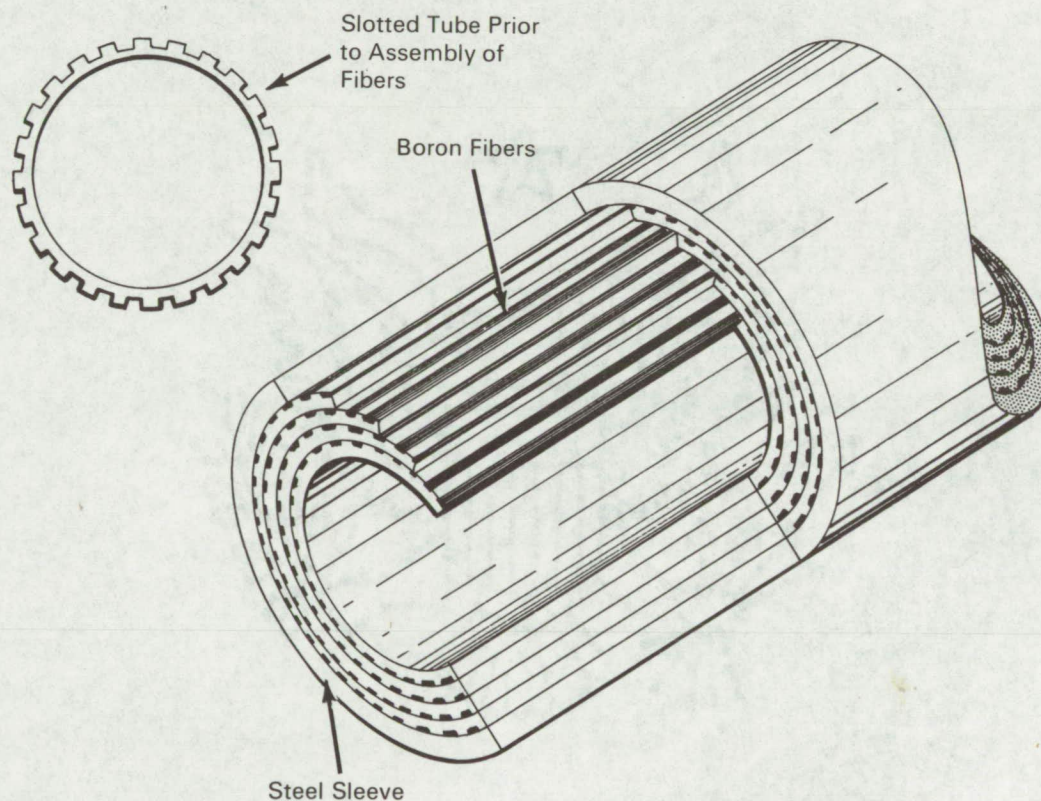


NASA TECH BRIEF



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Boron Fiber-Reinforced Aluminum Alloy Tubing: Experimental



An experimental prototype of a conceptual boron fiber-reinforced aluminum alloy tubing design has been fabricated. The objective of the experimentation is to develop an improved method of producing structural, lightweight, high-strength, high-modulus aluminum alloy tubing reinforced with boron fibers. This type of tubing is intended to meet requirements for lightweight structural members, such as aircraft struts, landing gears, and stringers, subjected to high shock loads and bending stresses.

The composite tubing is built up from a series of concentric, ductile aluminum alloy tubes having longitudinal slots along their outer peripheries in which boron fibers are imbedded. The fibers are placed in the slots of the tube of the smallest diameter and the subassembly is then encased in a slotted aluminum alloy tube of larger diameter. This assembly is passed through a die which brings the two tubes with the imbedded fibers into intimate contact (with possibly a slight reduction in diameter). The process

(continued overleaf)

is repeated by superimposing successively larger-diameter tubes over the preceding assembly until the desired outer diameter of the fiber-reinforced aluminum alloy tubing is attained. A sleeve of high-strength steel is then fitted over the composite aluminum alloy tubing and the two are drawn into intimate contact. The entire assembly is heated for 4 hours at 900°F to diffusion-bond the contacting surfaces of the aluminum alloy tubes and age-harden the steel sleeve. The relatively greater thermal expansion of the aluminum alloy tubes produces a compression against the outer sleeve which aids the diffusion-bonding process.

Note:

This Tech Brief is complete in itself. No additional information is available.

Patent status:

No patent action is contemplated by NASA.

Source: Emil S. Scherba of
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